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AUDIO-VISUAL APPLICATION TO EQUIPMENT CALIBRATION

by

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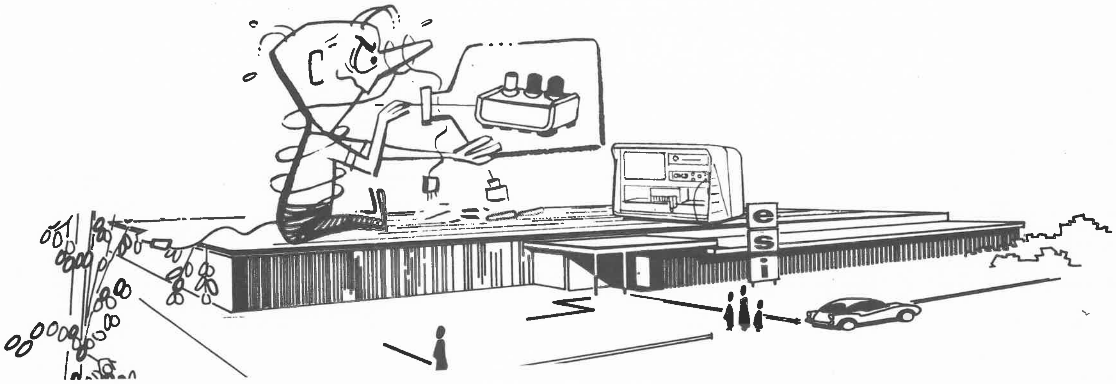

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AUDIO VISUAL APPLICATION TO EQUIPMENT CALIBRATION

1. Introduction

Why consider A-V technique for calibration training? Combining spoken material with pictures offers many benefits. Learning and supervision time are reduced, quality is higher and more uniform and operators are useful at a higher level of skill.

We are going to see how to make an A-V program. There will be a discussion of the purpose of various programs and the methods of analyzing a procedure. We will look at techniques for easier and less time consuming instruction writing and picture taking. Various ways will be shown to present the material for effective operator training.

2. Features of A-V Technique

There are many methods to train operators for calibration work. One of the best is the A-V technique. It can provide;

- accurate effective training procedures
- standardized training at widely separated test facilities
- sharply reduced training time and cost
- increased performance for a given operator skill level
- availability of complete instructions for periodic training review
- less supervisor time required for training makes more of his time available for planning and deciding
- improved operator understanding and confidence.

3. Making an A-V Program

3.1 The Purpose

The first thing to decide is the purpose of the training program. There are three areas to consider; teaching, practicing and working.

Teaching requires an explanation of the procedures and their steps. The operator becomes familiar with your reasoning and gains the technical background to increase his ability.

Practicing requires test procedures to be done by the operator. Detailed explanations are minimized with the emphasis on developing speed and skill.

Working uses A-V technique for actual calibration tests being performed by trained personnel. Very little explanation is required. The emphasis is on optimum measurement speed.

These purposes can be modified by combining two of them into one program for a saving of time and effort. Tailoring a program has real benefits but be careful not to try covering too many of the purposes with one program. If it is complete enough for teaching, it will probably be too slow for working.

3.2 The Methods of Analysis

Select a procedure in keeping with the purpose and look it over carefully. A complete study includes technical analysis, methods analysis, and work simplification. Technical analysis looks at what the procedure does or will do and why. Methods analysis shows how to arrange the procedure. Work simplification may offer a better way to get the same results in less time.

These analysis methods tend to overlap and lose their identity. However, they must be considered either singly or together for a complete procedure study.

3.3 Building the Package

A lot of good material now needs to be put in order. The next step is to organize and present it for someone else to use.

Break down the procedure into a series of simple steps. Start by looking at the number of operations to be performed. Operations can be lead connections to equipment, pre-setting dials and knobs for a measurement, making a measurement, etc.. Now see how many steps are needed for each operation. Use enough steps for a thorough explanation. Each step should contain a single instruction or idea.

Next, consider the pictures that will illustrate the operations. Do not use too many steps in a picture. Additional pictures with fewer steps will explain an operation with greater clarity.

A procedure breakdown can be done several ways. For example, a breakdown by operation can be followed with a picture breakdown. The steps in each operation are then fitted into the pictures.

The procedure now consists of detailed instructions and illustrations. Write or record how each instruction will be presented.

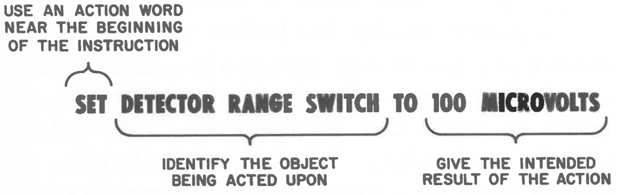
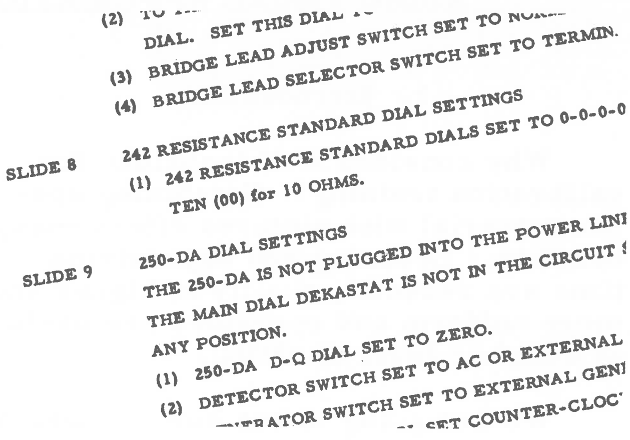

USE AN ACTION WORD NEAR THE BEGINNING OF THE INSTRUCTION
SET DETECTOR RANGE SWITCH TO 100 MICROVOLTS
IDENTIFY THE OBJECT BEING ACTED UPON
GIVE THE INTENDED RESULT OF THE ACTION

FIGURE 1. INSTRUCTION STYLE

Figure 1 shows a good way to form clear, understandable instructions. This method of sentence construction will develop a style (see Figure 2) that helps the operator follow the instruction quickly and easily.



(2)
DIAL. SET THIS DIAL
(3) BRIDGE LEAD ADJUST SWITCH SET TO TERMIN.
(4) BRIDGE LEAD SELECTOR SWITCH SET TO

SLIDE 8 242 RESISTANCE STANDARD DIAL SETTINGS
(1) 242 RESISTANCE STANDARD DIALS SET TO 0-0-0-0
TEN (00) for 10 OHMS.

SLIDE 9 250-DA DIAL SETTINGS
THE 250-DA IS NOT PLUGGED INTO THE POWER LIN
THE MAIN DIAL DEKASTAT IS NOT IN THE CIRCUIT
ANY POSITION.
(1) 250-DA D-Q DIAL SET TO ZERO.
(2) DETECTOR SWITCH SET TO AC OR EXTERNAL
ERATOR SWITCH SET TO EXTERNAL GEN
SET COUNTER-CLOC

FIGURE 2. INSTRUCTION SAMPLE

As the procedure develops it should have uniformity. It is poor practice to interrupt a style of presentation without good cause. Standardizing the instructions gives the operator confidence in the procedure and his ability to complete it. Full explanation of operational steps is given as they first appear in the procedure. If these steps or operations are repeated they can be shortened to speed up the procedure. However, they must still be adequately described. Most instructions should minimize explanations and come right to the point. Procedures for learning or for training will require greater explanation to be effective.

Illustrating a procedure cuts down the amount of spoken instruction needed. Many benefits of A-V come from using both the eyes and the ears to receive information. Therefore, pictures can and must add to a fuller understanding of the procedure.

Number the steps in a picture to save the operator hunting for the next one. This helps promote an even work pace. Relate the spoken steps to the illustrated steps with numbered arrows or markers. Color pictures will make the arrows or markers stand out for easy identification. An example is shown in Figure 3.

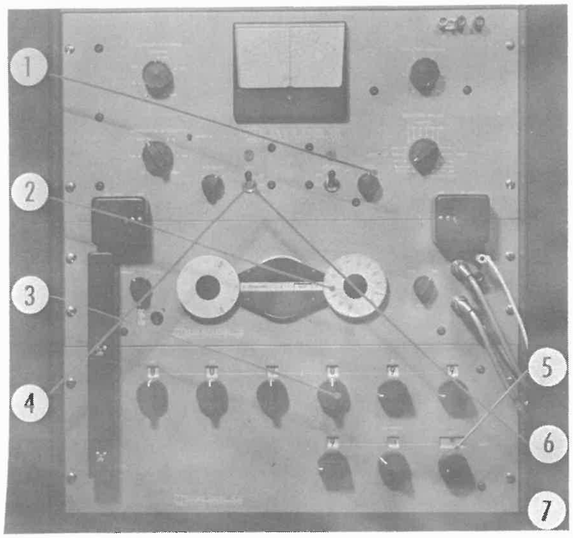


FIGURE 3. ILLUSTRATION SAMPLE

A picture should show just the operation involved. Avoid distracting background that will cause the operators eyes to wander. For a detailed or intricate operation move the camera in

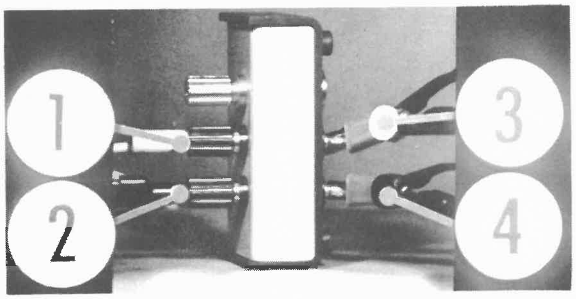


FIGURE 4. ILLUSTRATIONS FOR A SMALL AREA

Here, the picture becomes more important than any spoken instruction. It can describe at a glance an operation difficult to explain verbally. A picture should present the results of completing the steps presented with it. This shows the operator how the finished operation will look.

Pictures must be well taken to be effective. Avoid light reflection or heavy shadows in the work area. Proper focus is also very important. Setups with a depth of field will require special care to insure adequate focus.

3.4 Using the Package

The instructions are recorded and the pictures are made. How will we present this for the operators use? The most common form of A-V is the tape-slide package. The written material is recorded on tape. The pictures are 2x2 color 35mm slides. Commercial equipment is available to automatically play the tape using recorded signals to change the slides in sequence. Figure 5 shows an example of the equipment needed.

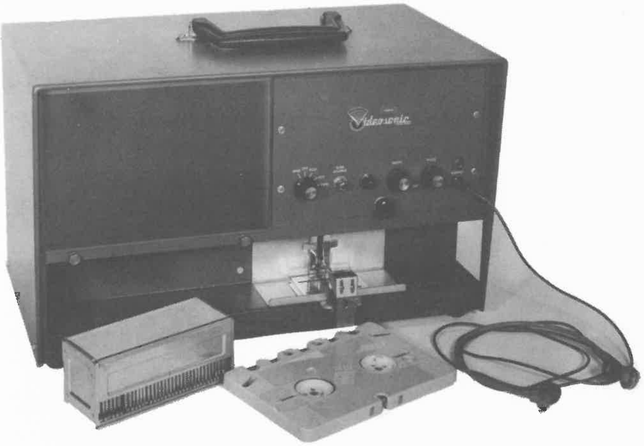


FIGURE 5. AUDIO VISUAL EQUIPMENT

This is the best way but it is expensive. A separate tape machine and slide projector can also be used to give the procedure. This is less expensive but inconvenient to operate. Another way is to record the instructions on tape with the pictures in a ring binder or book. This is inexpensive and presents the procedure in a fairly useable form. The last way is to bind up the instructions and pictures into a book. Its disadvantage is that the operator must slow down to read the instructions. A procedure in complete book form or a procedure with tape instructions and picture book can be easily made into a full tape slide presentation at a later time.

4. Conclusion

Personnel training with A-V technique is worth considering for the calibration laboratory. Developing an effective A-V procedure requires a knowledge of; the purpose, the analysis, making the procedure and using it. The resultant procedure can be tailor made to fit any circumstances and provide only those benefits desired.